UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION

UNITED STATES OF AMERICA	)	
	)	No. 03 CR 1032
v.	)	
	)	Hon. John F. Grady
H. MARC WATZMAN, also known as "Marvin Barash," "Herb Watman," and "Chiefer4@doglover.com"	)	

NOTICE OF FILING

To: Thomas Anthony Durkin
Durkin & Roberts
53 West Jackson Boulevard, Suite 615
Chicago, IL 60604

Patrick W. Blegen
53 W. Jackson, Suite 615
Chicago, IL 60604

PLEASE TAKE NOTICE that on, Wednesday, December 01, 2004, the undersigned filed with the Clerk of this Court the following document in the above captioned case: **GOVERNMENT'S RESPONSE TO DEFENDANT H. MARC WATZMAN'S *Daubert* FILING;,** service of which is being made upon you.

Respectfully submitted,

PATRICK J. FITZGERALD
United States Attorney

BY: J. Markus Funk/CC
T. MARKUS FUNK
Assistant United States Attorney
219 South Dearborn - 5000
Chicago, Illinois 60604
(312) 886-7635

STATE OF ILLINOIS)
) SS
COUNTY OF COOK)

Clara Long, being first duly sworn on oath deposes and says that she is employed in the Office of the United States Attorney for the Northern District of Illinois; and that on December 01, 2004, she caused the foregoing Notice and the above-described Motion(s) to be faxed to the above named individual(s)on said date.

Clara Long

SUBSCRIBED and SWORN to before me

this 1st day of December, 2004

Peggy Zabinski
NOTARY PUBLIC

"OFFICIAL SEAL"
Peggy M. Zabinski
Notary Public, State of Illinois
My Commission Exp. 06/04/2006

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GOVERNMENT'S RESPONSE TO
DEFENDANT H. MARC WATZMAN'S *DAUBERT* FILING

The UNITED STATES OF AMERICA, by its attorney, PATRICK J. FITZGERALD, United States Attorney for the Northern District of Illinois, submits the following response to defendant H. Marc Watzman's October 12, 2004, Daubert Filing. Defendant in his filing argues that the government should be precluded (1) from making "any reference to any digital images seized from the Defendant that do not contain actual minors," Defendant's Motion at 1; and (2) from presenting any expert testimony that the images seized from his computers and disks are of "real" children (as opposed to digitally "morphed" children) because, according to defendant, "it is doubtful that an expert can make such a determination even after review and analysis of the images and videos," id. at 3-8. As defendant sees it, "the only suitable witness to authenticate the digital images in this case would be individuals who participated in the creation of the particular image."

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Id. at 4 (emphasis added). As discussed below, however, defendant's requests are meritless and must be denied.

I. THE GOVERNMENT MAY PRESENT EVIDENCE THAT THIS DEFENDANT RECEIVED AND POSSESSED CERTAIN IMAGES WITHOUT EXPERT TESTIMONY THAT THE IMAGES ARE OF ACTUAL MINORS

The Second Superseding Indictment charges defendant with one count of possession, and attempted possession, of hundreds of images and videos depicting child pornography (Count One), with nine counts of receipt, and attempted receipt, of child pornography (Counts Two - Ten), and with one count of transferring money overseas to further the distribution and manufacture, and attempted distribution and manufacture, of child pornography (Count Eleven). See Exhibit A (Second Superseding Indictment). Defendant now argues that the government should only be permitted to make reference to those images in defendant's possession satisfying the completed crime in that they "contain actual minors," Defendant's Motion at 1. According to defendant, the government "has not provided a basis for a jury to conclude beyond a reasonable doubt that the images charged in the indictment involve actual minors," "it is impossible for a lay person to determine whether the video or still images contain actual minors," and "without participating in the production of the seized images or videos, an expert cannot know whether or not the visual depictions were created using an actual minor." Defendant's Motion at 1-5. Defendant, in short, contends that the government can never prosecute a child pornography case without the in-court testimony of either the victim or

one of the persons involved in the manufacturing the charged pornography. Defendant's arguments are fatally flawed for the following reasons:

A. Defendant Also Charged With Attempt

The government in its case-in-chief intends to offer the testimony of Dr. Sam Wassif (a pediatrician) and Dr. Richard Vorder Bruegge (an FBI Forensic Image Analysis expert) to support the government's position that certain images contained in defendant's collection depict actual minors being sexually exploited. See Exhibit B (CVs of Dr. Wassif and Dr. Vorder Bruegge). Because of the vast size of defendant's child pornography collection, however, the government will not offer such expert testimony as to each image and video found in defendant's possession. The government will not offer such expert testimony because, as set forth below, such testimony is simply not required.

For one, defendant in the Second Superseding Indictment is charged with attempt offenses conjunctively with the substantive receipt and possession offenses. As recognized in United States v. Starr, 2002 WL 31098482 (N.M. Ct. Crim. App., Sep. 16, 2002), "[e]ven if the Government's evidence--whatever form it may take--is insufficient to prove beyond a reasonable doubt that the individuals captured in the case-based photographs are real people, vice computer-generated, nonhuman images, a conviction of the lesser-included offense of an attempt . . . is still a viable possibility. . . ." See also United States v. Angle, 234 F.3d 326, 342-43 (7th Cir. 2000) (defendant charged with attempted receipt and possession of child pornography).

More specifically, to establish defendant's guilt of attempted receipt and possession of child pornography, the government must establish two things. First, the government must show that defendant knew or believed he possessed a real image of child pornography, regardless of whether he actually did. See 18 U.S.C.A. § 2252A(b)(2) (criminalizing attempted possession of child pornography). Belief that an image is real can naturally be proven circumstantially. See, e.g., United States v. de Francisco-Lopez, 939 F.2d 1405, 1409 (10th Cir. 1991) ("Employing such circumstantial evidence allows the government to prove a defendant had actual knowledge of an operative fact by proving deliberate acts committed by the defendant from which that actual knowledge can be logically inferred."). Second, to convict an individual of attempt, the government must identify the existence of a "substantial step" toward completion of the crime. Actual possession of a sufficiently pornographic image can constitute a substantial step toward the commission of the crime of child pornography possession. See generally United States v. Fiedeke, 384 F.3d 407, 412 (7th Cir. 2004). Keeping in mind that only those who believe their images are real can be convicted, a showing that defendant acquired "realistic" images helps satisfy the government's burden of showing that the crime of possessing child pornography was commenced. The government must therefore be permitted to present evidence of defendant's attempted possession of dozens of hour-long videos and thousands of digital images depicting child pornography.

B. Whether Depicted Child is "Real" Child is Jury Question

Defendant correctly recognizes that, with regard to the "completed" possession and receipt charges (as opposed to the lesser-included attempt charges discussed above), it is the government's burden to establish to the jury's satisfaction that the non-attempt images and videos depict actual children being sexually exploited. See generally Ashcroft v. Free Speech Coalition, 535 U.S. 234 (2002) (holding that the government must prove beyond a reasonable doubt that an image of child pornography depicts a "real" child); United States v. Hilton, 386 F.3d 13 (1st Cir. 2004) (same). Defendant's unsupported claims to the contrary notwithstanding, however, the government is not required to call witnesses who were actually involved in the manufacture of the child pornography in order to prove its case.

(i) *Government May Present Pictures and Videoclips to Jury Without Any Expert Testimony*

Although defendant elects to ignore all case-law inconsistent with his position, there is uniform support for the position that simply entering the images into evidence can meet the government's burden of establishing that the persons depicted are actual children. In fact, all six circuits that have addressed the issue in light of the Free Speech decision have concluded that the jury can make its decision by simply viewing the images themselves, and that no expert testimony is required (though it may at the government's option of course be presented). As the Sixth Circuit observed last month, "at this time, it appears that no circuit requires that expert evidence be introduced to prove the reality of

children portrayed in pornographic images." United States v. Farrelly, 2004 WL 2625830, at *3 n.4 (6th Cir. Oct. 25, 2004) (emphasis added) ("The question of whether the images are virtual or real is one of fact, to be determined by evidence about which argument can be made to the jury."); see also United States v. Slanina, 359 F.3d 356 (5th Cir. 2004) ("Free Speech Coalition did not establish a broad requirement that the Government must present expert testimony to establish that the unlawful image depicts a real child.") (per curiam); United States v. Kimler, 335 F.3d 1132, 1142 (10th Cir. 2003) (same); United States v. Deaton, 328 F.3d 454, 455 (8th Cir. 2003) (per curiam) (holding that images alone were sufficient to prove that production of charged images involved use of a real minor); United States v. Fuller, 77 Fed. Appx. 371, 379 (6th Cir. 2003) (unpublished) (jury could draw its own conclusions from viewing images); United States v. Hall, 312 F.3d 1250, 1260 (11th Cir. 2002) (despite unconstitutional jury instruction, examination of charged images showed that no reasonable jury could have found that images depicted virtual children as opposed to actual children); see also People v. Normand, 345 Ill. App.3d 736 (2004) (holding that under Illinois child pornography statute "the trier of fact may make a determination as to how an image was produced from the image itself"); Porath v. State, 2004 WL 1660763,. At *10 (Tex. App. (14 Dist.) Jul. 27, 2004) ("The Supreme Court in Free Speech Coalition . . . did not establish a broad requirement that the government must present expert testimony to establish that the unlawful image depicts a real child."); State v. Holze, 683 N.W.2d 93 (Wis. App. May 4,

2004) (same). Defendant's claim that it is "impossible for a lay person to determine whether the videos or still images contain actual children," Defendant's Motion at 3, therefore flies in the face of all current circuit court decisions that have addressed this issue. The government must therefore be permitted to introduce all of the images and videos in defendant's collection that depict what appears to be child pornography so that the jury can make its final determination as to whether the images in fact depict real minors.

(ii) ***Presence of Embedded Data***

In some instances, even a cursory examination of a digital image can reveal significant evidence that the image is a depiction of a real child, rather than an image of a wholly or partially computer-generated minor. Images created with a digital camera may contain metadata in the form of an Extended File Information (EXIF) header. An EXIF header may include such information as the make and model of the camera used to take the picture and the date and time the picture was taken. If the questioned image has an EXIF header intact, it guts any claim that an image was computer-generated or altered. Additionally, because metadata is a broad class of information, the metadata contained in an image may also indicate whether alterations were performed on an image by programs such as Adobe Photoshop.

(iii) ***Physician Testimony***

The government may also support the proof that images depict real children by

presenting the testimony of a physician that characteristics such as the proportions, body fat distribution, and skin tone of the children depicted are consistent with those of real children. In this case, pediatrician Dr. Sam Wassif is expected to testify that the images he reviewed are of real minor children being sexually molested. Testimony from such a medical expert is helpful in establishing the age of the child. Moreover, such testimony can demonstrate to the jury that the images in question are of real children. For example, in United States v. Nolan, 818 F.2d 1015 (1st Cir. 1987), the First Circuit held that the government need not present morphing expert testimony. The court also noted that during the direct examination of the pediatrician, the following exchange took place, which would also help negate such speculation:

> Q[:] And why do you conclude that, Doctor? People can doctor photographs. People can alter photographs. Why do you conclude that these are not altered photographs or perhaps composites of adult genitalia, let's say, with children's torsos and arms and legs and heads?
>
> A[:] Well, I think that that kind of conglomeration of parts, body parts, would be very bizarre appearing, because of the differences in size, texture. The gestalt would be wrong; in other words, the total picture would not be of a normal human being, most likely.

Id. at 1019. See also United States v. Bender, 290 F.3d 1279, 1282 (11th Cir. 2002) (pediatrician testified that "photographs appeared to portray real children"); United States v. Vig, 167 F.3d 443, 449-50 (8th Cir. 1999) (jury could infer from images and pediatrician's testimony that children depicted were real).

II. DEFENDANT'S *"DAUBERT"* CHALLENGE

Rule 702 of the Federal Rules of Evidence provides that, "[i]f . . . specialized knowledge will assist the trier of fact to understand evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education, may testify thereto. . . ." In Daubert, the Supreme Court set forth five factors to guide a court in assessing the reliability of scientific expert testimony. Those now-familiar factors are: (1) "whether a theory or technique .. . can be (and has been) tested"; (2) "whether the theory or technique has been subjected to peer review and publication"; (3) "the known or potential rate of error"; (4) "the existence and maintenance of standards controlling the technique's operation"; and (5) whether the technique or method has met with general acceptance. Daubert, 509 U.S. at 593-94. In Kumho Tire Company, Ltd. v. Carmichael, 526 U.S. 137, 147 (1999), however, the Supreme Court held that the Daubert 's "gatekeeping" obligation applies not only to "scientific" expert testimony, but to all kinds of expert testimony. Indeed, as the Court noted, Rule 702 makes no distinction between "scientific" knowledge and other forms of specialized knowledge. See id. At the same time, the Supreme Court acknowledged that, although the fundamental task of the trial court remains the same no matter what sort of specialized information is proffered, the Daubert factors set forth above ought not be considered a definitive check list suitable for the evaluation of all kinds of evidentiary submissions involving specialized knowledge. See id.

Using the Daubert factors as a point of departure, this court is free to fashion an approach more precisely tailored to an evaluation of the particular evidentiary submission before it. "[T]he measure of intellectual rigor will vary by the field of expertise and the way of demonstrating expertise will also vary." Tyus v. Urban Search Mgmt., 102 F.3d 256, 263 (7th Cir. 1996). Indeed, "genuine expertise may be based on experience or training." Id. As the Seventh Circuit pointed out in United States v. Allen, 269 F.3d 842, 846 (7th Cir. 2001), the Advisory Committee notes to Rule 702 specifically provides that "[i]n certain fields, experience is the predominant, if not the sole, basis for a great deal of reliable expert testimony." Fed. R. Evid. 702, 2000 Advisory Committee Note (emphasis added). For example, trial courts now routinely admit the testimony of law enforcement officers about the modus operandi of narcotics dealers. See, e.g., United States v. Doe, 149 F.3d 634, 636- 38 (7th Cir. 1998); United States v. Hubbard, 61 F.3d 1261, 1274-75 (7th Cir. 1995); United States v. Lipscomb, 14 F.3d 1236, 1239, 1242 (7th Cir. 1994). Experts in narcotics dealing typically are qualified based solely upon their field experience. See United States v. Allen, 269 F.3d 842, 846 (7th Cir. 2001).

It is likewise well-settled that where, as here, child pornography images and videoclips were produced after computer "morphing" technology became available, opinion testimony from a digital imaging expert that the charged images are not "morphed" or wholly computer generated is entirely appropriate as an aid to the jury.

An example of such appropriate use of such expert testimony to meet the government's burden of proof appears in United States v. Rearden, 349 F.3d 608 (9th Cir. 2003):

> The government offered the testimony of David Mark Verrier Jones, an employee of a visual effects studio, whom the court accepted as an expert in the creation of visual effects based on his training and experience in the film industry. Jones testified that in his opinion, the images transmitted by Rearden had not been manipulated in any manner. He indicated that they had not been composited (which involves the altering of images by, for example, transferring the head of one person to the body of another) or morphed (which in Jones's view involves the creation of an intermediate image from two other images). Jones stated that it was beyond the limits of modern computer graphics to create a completely artificial picture of a believable photo-realistic human being (except, perhaps, of people who are very small in the background). Rearden put on no evidence to the contrary. . . . He [Jones] examined the images and opined that they were not manipulated, that any attempted creation of a digital photo realistic human being would be readily apparent, and that these images were entirely consistent as photographs. Based on this testimony the trier of fact could reasonably conclude that the government had carried its burden of proving that the images depicted actual children.

Id. at 613-14.

Similarly, in United States v. Marchand, 308 F. Supp.2d 498 (D.N.J. 2004), a digital imaging expert from the FBI Forensic Audio Visual and Image Analysis Unit (FAVIAU) located in Quantico, Virginia, testified on behalf of the government and in rebuttal to the defense's expert. As the court stated in Marchand:

> The Government introduced proof that [computer]-created images do not look even remotely realistic. No [computer]-

> created image was adduced of a single realistic-looking human, even fully clothed. . . . Not one looked like a real person. Yet, every picture that the Defendant possessed appears absolutely real. Even the lighting and the shadows in each of the pictures is perfectly consistent with the various backgrounds contained in the images, a highly difficult feat to accomplish virtually. Even the Defendant's computer expert, when asked to point out those images that did not look like real photographs, could only point to one image, G121, and no others. Moreover, the expert conceded that when he looked at the pictures, he thought they were real.

Id. (citations omitted).

Here, the government has provided defendant with notice that it intends to present the testimony of Dr. Richard Vorder Bruegge, an expert in Forensic Image Analysis at the FBI's Forensic Audio, Video, and Image Analysis Unit in Quantico, VA. See Exhibit A (Dr. Vorder Bruegge's CV). Dr. Vorder Bruegge has been certified in federal and state courts as an expert in forensic image analysis examination on over 40 occasions, and has been certified as an expert in child pornography involving post-Ashcroft issues and related manipulated imagery on approximately 13 occasions. Dr. Vorder Bruegge has examined at least 15,000 still images, as well as hundreds of videos, featuring child pornography. Dr. Vorder Bruegge has been certified as an expert in, among others, the federal courts in the District of Maryland, the Western District of Louisiana; the Western District of Missouri, the Eastern District of Michigan, and the District of Minnesota. In no instance has Dr. Vorder Bruegge been found to lack the requisite expertise after being offered to the court as an expert.

As set forth in Exhibit A, Dr. Vorder Bruegge has approximately 20 years of experience analyzing digital images, including as a contractor for NASA, where he examined photographs taken from space of Venus in an attempt to digitally enhance them as much as technologically possible. Dr. Vorder Bruegge's current work with the FBI, in addition to the analysis of images of suspected child pornography, includes digitally enhancing hundreds videos of bank robberies, murders, kidnappings, etc. For example, Dr. Vorder Bruegge recently analyzed the video-taped decapitation of Daniel Pearl in Pakistan for the FBI and other governmental agencies to determine whether the video was authentic.

Dr. Vorder Bruegge will testify that he, in accordance with standard FBI policy, performs a summary analysis on each separate video or image examined. The examination involves, among other things, an analysis of the fluidity of motion, the perspective of objects and the scene, shapes in the scene, scale and sizes, shadows and quality of light, continuity of edges, human characteristics such as skin tone, textures, muscle movement, skin-to-skin contact, skin creases, hair, and the effects of gravity and physics. It is anticipated that Dr. Vorder Bruegge will explain to the jurors that "authentic" images of people display these characteristics, and that they are difficult to impossible to recreate using contemporary computer-generated imagery technology.

This is even more so true for moving videos such as defendant is charged with

receiving and possessing.[1] Human motion in an extended video is virtually impossible to replicate in a realistic manner. Movies such as Shrek, Finding Nemo, Final Fantasy, and Polar Express represent the state-of-the-art in video and motion picture technology, with each costing up to $100,000,000 or more to produce. Nevertheless, they do not come close to replicating an actual human being. Many of the videos found in defendant's possession were quite lengthy, including some that were over an hour in length. It is anticipated that Dr. Vorder Bruegge will testify that one of these videos was comprised of over 67,000 individual images. Dr. Vorder Bruegge will testify that it is would cost millions of dollars and thousands of man-hours to "artificially" or digitally produce such a video, and even then the video would not look realistic.

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[1] As one author aptly noted:

> To date, no wholly computer pornography generated child image has been produced that is virtually indistinguishable from a real image. Experts in the relevant community have searched for such an image and come away empty handed. If such an image existed it would be showcased by every pedophile in the country who was prosecuted for child pornography. As one commentator has noted, "Every computer generation has its own mythology," and this generation's is the existence of virtually indistinguishable images that are wholly computer generated.

Susan Kreston, Defeating the Virtual Defense in Child Pornography Prosecutions, 4 J. High Tech. L. 49 (2004) (citations omitted).

III. CONCLUSION

As set forth above, the government must be permitted to introduce the images of child pornography seized from defendant's residence. Moreover, Dr. Richard Vorder Bruegge should, pursuant to Fed. R. Evid. 702, be qualified as an expert in the area of Forensic Image Analysis.

Respectfully submitted,

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By: _____

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CURRICULUM VITAE
FBI Expert Witness

Updated: November 10, 2004

Richard W. Vorder Bruegge, Ph.D.

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PROFESSIONAL EXPERIENCE

Jan 1995 - present **Forensic Scientist/Examiner of Questioned Photographic Evidence**
Federal Bureau of Investigation, Investigative Technology Division, Quantico, VA.

Conducts examinations on questioned and known photographic evidence, which includes film, video, and digital images. Supervises technical staff in forensic examinations. Manages the National Automotive Image File and the Child Exploitation and Obscenity Reference File. Performs research in the forensic analysis of imagery. Provides technical assistance to law enforcement organizations in U.S. and abroad. Serves on multiple external and FBI internal working groups related to imaging policies and standards.

Oct 1990 - Dec 1994 **Staff Scientist**
Science Applications International Corporation (SAIC), Washington, D.C.

Provided scientific and technical support to the National Aeronautics and Space Administration (NASA) Solar System Exploration Division in the development of missions of exploration to solar system objects including planets, comets, and asteroids. Provided scientific and technical support in the development and operations of the Department of Defense's Clementine mission to the Moon. Served as Principal Investigator under the NASA Venus Data Analysis Program.

EDUCATION

Sep 1985 - May 1991 **Brown University**
Providence, RI
Master of Science (Sc.M.) and Ph.D.
Major: Geological Sciences

Sep 1981 - May 1985 **Brown University**
Providence, RI
Bachelor of Science (Sc.B)
Major: Engineering

FORENSIC EXAMINATION / TESTIMONY EXPERIENCE

Have worked full time in FBI laboratories dedicated to imaging science for over nine years. Conducted video/image analysis examinations in over 500 criminal, civil and administrative matters, which includes submissions from local, state and federal law enforcement organizations. Have testified as an expert witness in Municipal, State, and Federal Courts in over 40 instances.

PROFESSIONAL TRAINING

A program of forensic photography established by the FBI Laboratory that includes hundreds of hours of formal course work in photographic studies, extensive readings in numerous texts and technical journals on the subject, laboratory and factory tours, and conducting examinations on casework submitted to the FBI under the guidance of qualified senior examiners. Partial list of training follows:

A. FBI Academy
    1. Laboratory Forensic Examiner Training
    2. Basic Photography
    3. Crime Laboratory Forensic Photography (3 hrs. credit from U- Va)
    4. SOG/SSG Photo Surveillance In-Service
    5. Digital Image Processing
B. FBI Laboratory
    1. Softcopy Photogrammetry
    2. Introduction to Forensic Applications of the Avid Media Composer
C. Director of Imagery Exploitation, National Defence Headquarters (Canada)
    1. & 2. Single Photo Perspective Course (Basic& Advanced)
D. Rochester Institute of Technology
    1. Electronic Imaging
    2. Digital Image Processing
    3. Photoshop for Engineers
E. Society of Photo-Optical Instrumentation Engineers
    1. Basic Optical Design
F. Polaroid School of Law Enforcement Imaging
    1. Analysis of Polaroid Products
G. Nikon Inc.
    1. Crime Scene Reconstruction Using AIMS (Automated Invest'n Meas. Sys.)
H. Defense Mapping School (DMS)
    1. Stereoscopic Interpretation of Aerial Photographs (SIAP)
I. The SONY Video Institute
    1. ABC's of Video
J. Orange Technologies
    1. Basic Photoshop 5.0
K. International Association for Identification
    1. Earprint Identification Workshop
L. Ocean Systems
    1. Forensic Video analysis on the dTective System from Ocean Systems
M. 3DMetrics
    1. Operation of 3DFlash!Cam
N. Henninger Education Center
    1./2. AVID 101/110 Intro to Media Composer Editing & Effects
O. WPAFB/NAIC
    1. Close Range Photogrammetry Methodologies
P. Peter Ratner/James Madison University
    1. Fundamentals of Creating Virtual People

CURRENT PROFESSIONAL AFFILIATIONS/COMMITTEES/HONOR SOCIETIES

Scientific Working Group on Imaging Technologies (SWGIT) (Chairman, 2000-present)
Scientific Working Group on Digital Evidence (SWGDE)
American Academy of Forensic Sciences (AAFS) (Member)
Mid-Atlantic Association of Forensic Scientists (MAAFS)
American Society for Photogrammetry and Remote Sensing (ASPRS)
The International Society for Optical Engineering (SPIE)
International Association for Identification (IAI)
American Geophysical Union (AGU)
Sigma Xi
Tau Beta Pi

FORMAL PRESENTATIONS AND PUBLICATIONS

- *Determining a Bank Robber's Height from Video using Reverse Projection Photogrammetry*, MAAFS, 1995
- *Some Cautions Regarding the Application of Biometric Analysis and Computer-Aided Facial Recognition in Law Enforcement* , ADPA, 1996 (co-author with T. Musheno)
- *Reverse Projection Photogrammetry* (Photographic Resources Update/1996) (co-author w/ W. J. Stokes)
- *Photogrammetry as a Means to Detect Photographic Deception* (AAFS/1997)
- *Detecting Fraud and Alteration in Digital Imagery* (FBI DISLE/1997)
- *Photographic Identification of Blue Jeans from Bank Surveillance Film* (AAFS/1998)
- *Digital Imaging and the Examination of Photographic Evidence* (IAI/1998)
- *Noise Reduction of Video Imagery Through Simple Averaging* (SPIE/1998)
- *Photographic Identification of Denim Trousers from Bank Surveillance Film* (J Forensic Sci 1999; 44(3):613-622)
- *Image Processing of Surveillance Video Tape & the Identification of a Mini-Van* (AAFS/1999)
- *Knuckle Crease Patterns & Stray Marks as a Means of Photographic Identification*(IAI/1999)
- *Digital Evidence Laboratories* (IAFS/1999 Workshop)
- *Digital Image Processing in Forensic Photographic Examinations* (IAFS/1999)
- *Developing a Digital Evidence Program for your Laboratory* (AAFS/2000 Workshop)
- *Analytical Photogrammetric Analysis of Bank Robbery Surveillance Film* (AAFS/2000) (co-author w/ D.A. Bonner)
- *Identification of Individuals through Photographic Facial Comparisons* (IACI/2000) (co-author w/ T. Musheno)
- *The Scientific Working Group on Imaging Technologies: Developing Practical Guidelines for Law Enforcement Applications* (IAI/2000 Workshop)
- *Image Analysis: Getting the most out of your surveillance images* (NATIA/2000)
- *Techniques in Forensic Image Comparisons* (Toronto Police Forensic Identification Seminar/2001)
- *Techniques in Forensic Photogrammetry* (Toronto Police FIS/2001)
- *The Scientific Working Group on Imaging Technologies (SWGIT) and the Future of Imaging in Law Enforcement* (Toronto Police FIS/2001)
- *Forensic Photogrammetry* (Forensic Video and the Law/May 2001 and October 2001)
- *Scientific Working Group on Imaging Technologies (SWGIT) Update* (IAI/2001 Workshop)

FORMAL PRESENTATIONS AND PUBLICATIONS (continued)

- *Photographic Identification of Clothing from Wear and Tear and Manufactured Characteristics - The Band-Aid Bandit Case* (IAI/2001 Workshop)
- *Acquiring, Processing, and Protecting Imaging Evidence - Guidelines for Managers, Crime Scene Personnel, and Laboratory Experts* (AAFS/2002 Workshop)
- *Photographic Identification of a Native American Artifact Using Visible and Ultraviolet Light* (AAFS/2002)
- *Comparing the Resolution of Film to Digital Cameras: Cautions for the Forensic Community* (AAFS/ SPIE/ MAAFS 2002)
- *Imaging Sciences in Forensics and Criminology* (chapter in the Encyclopedia of Imaging Science and Technology, John Wiley & Sons, Inc., New York, 2002)
- *Forensic Photogrammetry* (IAI/2002 Workshop)
- *Scientific Working Group on Imaging Technologies (SWGIT) Update* (IAI/2002 Workshop)
- *Photographic Identification of Two Native American Artifacts* (IAI/2002 Workshop)
- *Image Examinations in Child Pornography Cases* ("Advanced Child Exploitation Seminar" NAC, Columbia, SC, 2002)
- *When is Evidence Considered Manipulated?* (Texas Center for the Judiciary 2003 Reg. Conf., El Paso)
- *Detecting Image Manipulation in a Digital World* (IAI/2003 Workshop) (co-author w/ T. Musheno)
- *Reverse Projection Photogrammetry* (IAI/2003 Workshop)
- *Scientific Working Group on Imaging Technologies (SWGIT) Update* (IAI/2003 Workshop)
- *Digital Imaging in the Laboratory* (ASCLD 2003 Conference)
- *SWGIT - The Scientific Working Group on Imaging Technologies* (ASCLD 2003 Conference)
- *Forensic Image and Video Processing* (AAFS/2004 Workshop)
- *Discovering the Electronic Trail of Evil: It's All About Digital Evidence, Technology, and Crime!* (AAFS/2004 Seminar)
- *SWGIT Presents: Part 1 - Does Your Forensic Imaging Unit Need Accreditation as a "Digital Evidence Unit?"* (AAFS/2004)
- *SWGIT Presents: Part 2 - Forensic Image Processing, Repeatability, and the Myth of Bit-for-Bit Duplicates* (AAFS/2004)
- *Facial Comparison Analysis at the FBI* (ENFSI-DIWG/2004)
- *Is Digital Aerial Photography Admissible? - SWGIT and the Law Enforcement Perspective* (ASPRS Panel Member/2004)
- *Height Determination using the Perspective Grid Technique* (IAI/2004 Workshop)
- *Detecting Image Manipulation in a Digital World - 2004 Update* (IAI/2004 Workshop)
- *A Look at Statistics in Photographic Comparisons* (IAI/2004 Workshop)
- *Scientific Working Group on Imaging Technologies (SWGIT) Update* (IAI/2004 Workshop)
- *Courtroom Testimony for Photographic Evidence & Digital Images in the Courtroom* (2004 FBI Field Photographers Conference)